<u>Amendments to the Specification:</u>

Please replace paragraph [0010] with the following amended paragraph:

[0010] As such, there [[exist]] <u>exists</u> a need for controlling active power consumption and reducing voltage leakage in an integrated circuit having devices with different threshold voltages.

Please replace paragraph [0022] with the following amended paragraph:

[0022] More specifically, FIG. 1 illustrates an adaptive supply voltage and body bias apparatus using a multi-threshold, supply and bias architecture (MTSB) 100. The MTSB architecture 100 includes a master controller 102, a dynamic voltage supplier 104, an adaptive body [[bias]] <u>biaser</u> 106 and multiple threshold voltage devices 108. The master controller 102 receives an operations state value 110. The operation state value 110 may be received from any suitable outside source, such as a control processor. In another embodiment, the master controller 102 may include a look-up table having operations state values stored therein and the master controller 102 operative to receive an indicator such that a operations state value 110 may be retrieved from the internal look-up table within the master controller 102.

Please replace paragraph [0023] with the following amended paragraph:

[0023] Regardless therefore, the master controller 102 in response to the operations state value 110 generates a supply voltage indicator 112. The ~~dynamics~~ <u>dynamic</u> voltage supplier 104 receives the supply voltage indicator 112 from the master controller 102. In one embodiment, the supply voltage indicator may be an actual voltage value or in another embodiment may be any suitable indicator indicating the corresponding requested voltage output from the dynamic

voltage supplier 104. In response to the supply voltage indicator 112, the dynamic voltage supplier 104 generates a supply voltage 114. The multiple threshold voltage devices 108 receive the supply voltage 114 as a power source for powering the multiple devices, wherein the devices have different threshold voltages.

Please replace paragraph [0024] with the following amended paragraph:

[0024] The master controller 102, ~~furthering~~ further responding to the operations state value 110, generates a body bias indicator 116. The adaptive body biaser 106 receives the body bias indicator 116 and generates a body bias voltage 120 therefrom. The body bias indicator 116 may be a voltage value or may be any suitable indicator indicating a corresponding body bias voltage 120 generated by the adaptive body biaser 106. As noted above, the adaptive body biaser 106, operates in accordance with known operating techniques as recognized by one having ordinary skill in the art. The body bias voltage 120 may be a backward bias voltage or a forward bias voltage. The multiple threshold voltage devices 108 receives the body bias voltage from the adaptive body biaser 106 for powering up and performing the designated functions for each of the devices within the multiple threshold devices 108.

Please replace paragraph [0025] with the following amended paragraph:

[0025] The adaptive body biaser 106 also receives voltage indicator 118 from the dynamic voltage supplier 104. The voltage indicator 118 indicates the voltage level of the supply voltage 114 provided to the multiple threshold voltage devices 108. The adaptive body biaser 106 further includes a feedback loop 122, which provides feedback and iterative knowledge for the adaptive body biaser 106 in determining the body bias voltage 120 including

tracking the local body bias variation. Therefore, in accordance with known adaptive body biaser 106 operations, the body bias voltage 120 is generated based on not only the body bias indicator 116, voltage indicator 118, but also the feedback loop 122. In another embodiment, a feedback signal may be included within the dynamic voltage supplier 104 to compensate the local supply voltage variation.

Please replace paragraph [0026] with the following amended paragraph:

[0026] FIG. 2 states a graphical representation of the multiple threshold voltage devices 108 including multiple threshold devices, such as devices 130, 132 and 134. In a typical embodiment, the different devices 130, 132 and 134 have different threshold voltages based on different operations. In the MTSB architecture 100, low threshold voltage devices are defined within the critical path and high threshold devices are in other logic with backward biasing at lower supply voltages to reduce overall power. Since the high threshold voltage device is used, it eliminates additional leakage dissipated in non-critical paths. However, different threshold voltage ~~devices~~ devices' usage is highly dependent on system requirement which is not limited to the above implementation. Moreover, as the power is highly dependent on the supply voltage, the lower supply voltage thereby increases power savings. As recognized by one having ordinary skill in the art, the multiple threshold voltage devices 108 may be any suitable shape encompassing any suitable number of processing elements, but the device 108 is illustrated in a matrix for exemplary purposes only and is not meant to be so limiting herein. Moreover, further discussion regarding the individual specific devices, such as 130, 132 or 134 are discussed in further detail below with regards to FIG. 6.

Please replace paragraph [0027] with the following amended paragraph:

[0027] FIG. 3 illustrates another embodiment of an adaptive supply voltage and body bias apparatus 138 using the MTSB architecture. The apparatus 138, similar to the apparatus 100 of FIG. 1, includes the master controller 102, the dynamic voltage ~~supply circuit~~ supplier 104, the adaptive body ~~bias circuit~~ biaser 106 and the multiple threshold voltage devices 108. The master controller 102 receives the operation state value 110 and generates the supply voltage indicator 112 and the body bias indicator 116. The dynamic ~~supply voltage circuit~~ voltage supplier 104 generates the supply voltage 114 and the adaptive body ~~bias circuit~~ biaser 106 generates the body bias voltage 120 in response to the voltage indicator 118, the body bias indicator 116 and the feedback loop 122.

Please replace paragraph [0030] with the following amended paragraph:

[0030] The master controller 102 receives the reference frequency indicator 144. The master controller 102 thereupon generates a second supply voltage indicator [[in]] and a second body bias indicator, similar to 112 and 116 respective, in response to the frequency offset value 144 and the operations state value 110. The dynamic ~~supply voltage circuit~~ voltage supplier 104 receives the second supply voltage indicator, similar to indicator 112, and the adaptive body ~~bias circuit~~ biaser 106 receives the second body bias indicator, similar to the body bias indicator 116. The dynamic ~~supply voltage circuit~~ voltage supplier 104 generates a second supply voltage, similar to supply voltage 114, in accordance with standard dynamic ~~supply voltage circuit~~ voltage supplier operations. The adaptive body bias circuit 106 generates a second body bias voltage, similar to body bias voltage 120, in accordance with standard adaptive body ~~bias circuit~~ biaser operations.

Please replace paragraph [0031] with the following amended paragraph:

[0031] Thereupon, the multiple threshold voltage devices 108 receive the second supply voltage from the dynamic ~~supply voltage circuit~~ voltage supplier 104 and the second body bias voltage from the adaptive body ~~bias circuit~~ biaser 106. In response thereto, the ~~computing devices having the~~ multiple threshold ~~voltages~~ voltage devices 108 are further tuned for efficient operation including the proper power reduction based on the supply voltage, such as supply voltage 114 or the second supply voltage, in combination with corresponding body biasing, such as the body bias voltage 120 and the second body bias voltage.

Please replace paragraph [0033] with the following amended paragraph:

[0033] The first operation state 110 value is a supercharged state 152 that includes a high supply voltage 114 VddH and a body bias 120 of zero. When the operation state value 110 indicates high performance 154, the supply voltage 114 is once again a high supply voltage, VddH and a body bias voltage 120 is high, VbbH. If the operation state value 110 indicates moderate performance, 156, the supply voltage 114 is low, VddL and the body bias voltage 120 is zero. [[The]] If the operation state value 110 indicates low performance 158, the supply voltage 114 is set low and the body bias voltage 120 is also set low. While in a standby mode 160, the supply voltage 114 and the body bias voltage 120 are both set to a standby voltage, which may be a very low voltage level relative to even the low voltage levels of the VddL and VbbL.

Please replace paragraph [0034] with the following amended paragraph:

[0034] FIG. 5 illustrates a graphical representation of the frequency monitor 142 receiving the output frequency indicator 140, the reference frequency indicator 146 and therein generating the ~~offset frequency~~ frequency offset value 144. In one embodiment, the frequency monitor 142 may be a simple comparator, which allows for generating a delta value between the output frequency indicator 140 and the reference frequency indicator 146. As recognized by one have ordinary skill in the art, any other suitable method may be utilized to determine a frequency ~~difference~~ offset value between the output frequency indicator 140 from the multiple threshold voltage devices 108 and the reference frequency indicator 146 to generate the ~~offset~~ frequency offset value 144.

Please replace paragraph [0035] with the following amended paragraph:

[0035] FIG. 6 illustrates two computing devices 180 and 182 having different threshold voltages. The device 180 has a high threshold voltage and the device 182 has a low threshold voltage. As recognized by one having ordinary skill in the art, the biasing voltage is composed of a p-substrate body bias voltage for p-type devices and n-substrate body bias voltage for n-type devices, illustrated as device 180. The device 180 has voltage Vdd 186. The device 180 receives input voltage [[184]] 184. The body bias voltage is then determined across the gates, wherein the body bias voltages in the high threshold voltage device 180 include the p-substrate body bias voltage (Vpb') 188 and the n-substrate body bias voltage (Vnb') 190.

Please replace paragraph [0036] with the following amended paragraph:

[0036] Similar to the first computing device 180, the second computing device 182 has the ~~threshold~~ supply voltage Vdd 194 which is provided across the p-junction and the n-junction to generate the p-substrate body bias voltage (Vpb) 196 and the n-substrate body bias voltage (Vnb) 198. These voltages are in response to the input voltage 192, wherein the computing device 182 has a low threshold voltage. The substrate body bias voltages can be the same or different dependent on the applications, it means that the same p-substrate body bias voltages (Vpb') and (Vpb) can be applied for both high/low threshold voltage p-type devices or they can be adjusted differently for various threshold voltage devices, the same principle ~~is apply~~ applies for n-substrate body bias voltages (Vnb') and (Vnb) for n-type devices.

Please replace paragraph [0038] with the following amended paragraph:

[0038] FIG. 7 illustrates one embodiment of a method for adaptive supply voltage and body bias, 200. The method begins, step 202, by generating a supply voltage indicator and a body bias indicator in response to an operation state value. As discussed above with regards to FIG. 1, a supply voltage indicator 112 and a body bias indicator 116 are generated in response to the operation state value 110. The next step, step 204, is generating a supply voltage in response to the supply voltage indicator. In one embodiment, the dynamic voltage supplier 104 performs this operation. The next step, step 206, is generating a body [[bias]] biaser voltage in response to the body bias indicator. In one embodiment, the adaptive body bias 106 thereupon performs this operation to generate the body bias voltage 120. It should also be noted in another embodiment that the body bias indicator 120 is generated in response to a voltage indicator 118 and feedback loop 122, as illustrated in FIG. 1.

Please replace paragraph [0039] with the following amended paragraph:

[0039] ~~Step 208~~ The next step, step 208, is ~~supply~~ providing the supply voltage and the body bias voltage to a plurality of computing devices, each of the computing devices having one of a plurality of threshold voltages. Referring back to FIG. 1, the supply voltage 114 and the body bias voltage 120 are provided to the multiple threshold voltage devices 108, wherein the devices 108 have different threshold voltages. As such, the method allows for adaptive supply voltage and body bias through providing a generated body bias voltage and supply voltage for multiple computing devices having varying threshold voltages. As such, in one embodiment of the present invention, the method is complete, step 210.

Please replace paragraph [0047] with the following amended paragraph:

[0047] The body bias may be dynamically adjusted to overcome the process parameter variations, therefore overall speed performance of a processing device may be consistent. The present invention improves over the prior art by not only incorporating both the dynamic voltage supplier 104 and the adaptive body [[bias]] biaser 106 in conjunction with a master controller 102, but is also applicable to computing devices having multiple threshold voltages, such as the multiple threshold voltage devices 108. Prior techniques were limited to only dynamic voltage supply, only adaptive body bias or combining the dynamic voltage supply and adaptive body bias to processing elements having the same threshold voltage. Wherein, the present invention allows for applicability to computing devices having varying threshold voltages.

Please replace paragraph [0048] with the following amended paragraph:

[0048] It should be understood that the implementation of other variations and modifications of the invention and its various aspects will be apparent to those of ordinary skill in the art, and that the invention is not limited by the specific embodiments described herein. For example, the frequency monitor 142 may be incorporated within the master controller 102 and utilize a straight comparator or any other suitable means for converting a frequency value to generate the frequency offset value 144 so the master controller 102 may thereupon provide updated ~~voltage and body bias commands~~ <u>supply voltage indicators and body bias indicators</u> to the dynamic ~~supply voltage circuit~~ <u>voltage supplier</u> 104 and adaptive body ~~bias circuit~~ <u>biaser</u> 106. It is therefore contemplated to cover by the present invention, any and all modifications, variations, or equivalents that follow in the spirit and scope of the basic underlying principles disclosed and claimed herein.